

National Aeronautics and  
Space Administration  
**Lyndon B. Johnson Space Center**  
Houston, Texas



## Two down

The second shuttle-Mir docking mis-  
sion is documented in photographs.  
Photos on Page 3.



## Reaching out

Cooperative education students from  
JSC drum up interest in science, math,  
aerospace. Photo on Page 4.

# Space News Roundup

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## Endeavour rolls for mating to boosters, tank

By James Hartsfield

Preparations of *Endeavour* are proceeding smoothly at Kennedy Space Center to kick off the 1996 shuttle flight schedule with a planned launch of STS-72 around Jan. 11.

With two space walks and two rendezvous operations—one to retrieve the Japanese Space Flyer Unit satellite and another to deploy and retrieve the OAST-FLYER experiment package—STS-72 is set to be a fitting start for what is planned to be among the most versatile years of shuttle flights ever.

*Endeavour* was on the move this week, rolling from the Bay 3 shuttle processing hangar Wednesday to the Vehicle Assembly

Bldg., where it will be hoisted vertical and mated to the STS-72 solid rockets and fuel tank. Early this week, technicians closed the payload bay doors, weighed the spacecraft and measured the center of gravity. After a short stay in the VAB, *Endeavour* is scheduled to be rolled out to Pad 39B on Tuesday.

The STS-72 crew—Commander Brian Duffy, Pilot Brent Jett and Mission Specialists Leroy Chiao, Winston Scott, Koichi Wakata and Daniel Barry—will travel to KSC Dec. 12 for the Terminal Countdown Demonstration Test, a



dress rehearsal at Pad 39B.

Meanwhile, *Columbia* is in the Bay 2 processing hangar being readied for what is to be the second flight of 1996, STS-75, a reflight of the Tethered Satellite System.

Work on *Columbia* this week included servicing the Freon coolant loops and removing the forward reaction control system for maintenance. The main engines are to be installed Dec. 12 and the work on the forward steering jets is expected to be completed by Dec. 19. STS-75 is targeted for a launch around Feb. 22, 1996.

Elsewhere, *Atlantis*, fresh from the second shuttle trip to the Russian Mir Space Station on STS-74, is in the Bay 1 hangar beginning preparations for STS-76, the third flight of 1996 and the third docking with Mir.

Technicians will remove the IMAX camera from *Atlantis'* cargo bay this week as well as the Orbiter Docking System. Upcoming work includes removal of the main engines and mechanical arm around Dec. 12.

*Discovery* remains at the Rockwell shuttle factory in Palmdale, Calif., undergoing a series of inspections and modifications that include work to prepare it for dockings with the International Space Station.

## Rendezvous, trajectory czar Bill Tindall dies

Howard W. "Bill" Tindall Jr., the former director of Flight Operations at the Manned Spacecraft Center who colleagues say contributed more than anyone individually to the success of Apollo, died Nov. 20 in Orleans, Mass.

Tindall, 70, of Dallas, retired from NASA in 1979 after 31 years of



Tindall

working on real-time computer programming and orbital trajectory development for Project Mercury, leading the development of Gemini rendezvous techniques, and designing lunar

orbiting and landing trajectories.

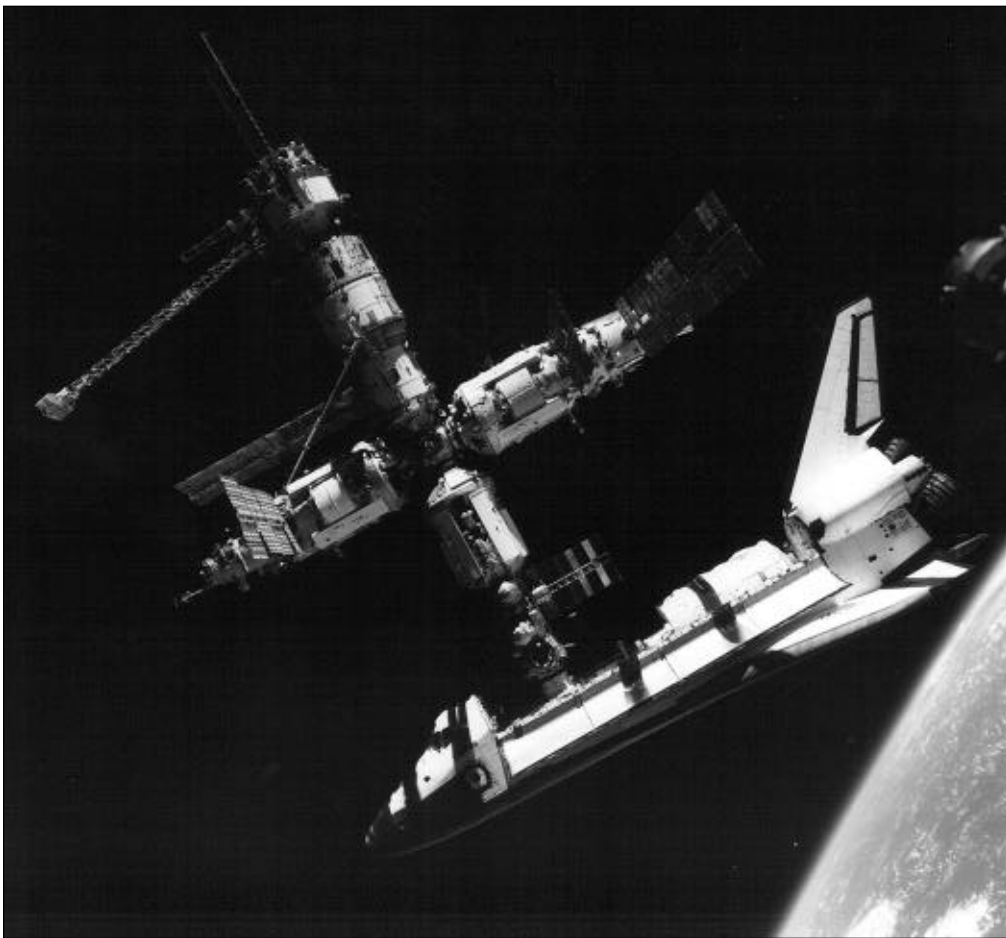
After retirement, he was a consultant on NASA's unmanned deep space probes and on a new air traffic control system for the Federal Aviation Administration that has yet to be implemented on a broad scale, former MSC Director Christopher Kraft said.

According to Kraft, Tindall was a unique and highly intelligent human being, well-liked and well-spoken.

"He was very highly respected from everyone from center directors to program managers to astronauts," Kraft said. "It would be very difficult for me to find anyone who contributed more individually to the success of Apollo than Bill Tindall."

Born in New York City in 1925, Tindall served on Navy destroyers in the latter part of World War II before entering Brown University, Providence, R.I., and receiving a bachelor's degree in mechanical engineering in 1948. That same year, he

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Russian Space Agency photo courtesy of NASA

The Space Shuttle *Atlantis* prepares to undock from Russia's Mir Space Station on July 4 as Cosmonaut Nikolai Budarin flies in formation in a Soyuz spacecraft, photographing the event.

## Stardust gets 'go' as next Discovery flight

A spacecraft designed to gather samples of dust spewed from a comet for return to Earth and detailed analysis has been selected to become the fourth flight mission in NASA's Discovery program.

Known as Stardust, the mission also will gather and return samples of interstellar dust that the spacecraft encounters during its trip through the Solar System to fly by a comet called Wild-2 in January 2004.

Stardust was one of three Discovery mission proposals selected for further study as part of a February 1995 announcement by NASA that a Moon-orbiting mission called Lunar Prospector had been selected as the third Discovery flight.

"Stardust was rated highest in terms of scientific content and, when combined with its low cost and high probability of success, this translates into the best return on investment for

the nation," said Dr. Wesley Huntress, NASA associate administrator for Space Science.

The Stardust mission team is led by Principal Investigator Dr. Donald Brownlee of the University of Washington in Seattle, with Lockheed-Martin Astronautics, Denver, as the contractor building the spacecraft. NASA's Jet Propulsion Laboratory will provide project management.

Comet Wild-2 is known as a "fresh

comet" because its orbit was deflected from much farther out in the Solar System by the gravitational attraction of Jupiter in 1974.

Stardust will approach as close as 62 miles to the comet's nucleus.

"Space scientists are intensely interested in comets because we believe that most of them are well-preserved remnants from the earliest days of star and planetary formation."

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## NASA scientists gain insight into disease

Understanding could lead to vaccine against parasite that afflicts millions

Scientists at NASA's Marshall Space Flight Center have taken an important step in understanding the molecular structure of a disease that afflicts 200 to 300 million people and is second only to malaria in cause of death worldwide. The disease, known as Schistosomiasis, is caused by parasites found in contaminated water.

"We were able to determine a three-dimensional atomic structure of an important enzyme from one of four species of parasites known to cause schistosomiasis," explained Dr. Daniel Carter, research director and chief of MSFC's Biophysics and Advanced Materials Branch of the Space Sciences Laboratory. "That allowed us to identify critical parts of

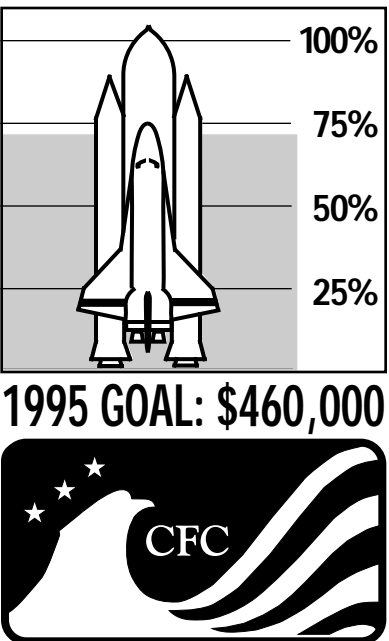
the enzyme's surface structure which elicit the immune responses to the disease. This important step seems to offer the most potential for developing vaccines that protect people against the entire species of schistosomiasis parasites, not just one species," said Carter.

Using highly specialized X-ray equipment and protein crystallization techniques developed for space-based microgravity research, biophysics researchers were able to locate key positions of individual atoms in the enzyme, also a major target for drugs used in the treatment of schistosomiasis, and build a computer picture or blueprint of the schistosoma enzyme structure.

The determination of the enzyme structure offers the possibility of combining such techniques as the use of disease fighting drugs with the development of preventative vaccines to form an effective barrier against the transmission of schistosomiasis.

"Building a person's immunity is one way to fight schistosomiasis," explained Carter. "Many people are repeatedly infected with the disease. If we can break the life cycle of the parasite by vaccinating people against transmission of the disease, we can make a major step toward eliminating the threat of schistosomiasis in those parts of the world where it poses a major health hazard."

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## Two crews to brief employees

The new schedule for post-flight briefings includes a change to next week's date for a presentation by the STS-74 crew, and a new date for the STS-73 briefing that was postponed.

The STS-73 crew—Commander Ken Bowersox, Pilot Kent Rominger, Mission Specialists Cady Coleman, Mike Lopez-Alegria and Kathy Thornton, and Payload Specialists Al Sacco and Fred Leslie—will share memories of their United States Microgravity Laboratory-2 mission from 2-3:30 p.m. Wednesday in Teague Auditorium.

The STS-74 crew—Commander Ken Cameron, Pilot Jim Halsell, and Mission Specialists Chris Hadfield, Please see **STS-74**, Page 4